no. A-196

fraction munchers

instructional computing courseware
for the **apple**® **II** computer

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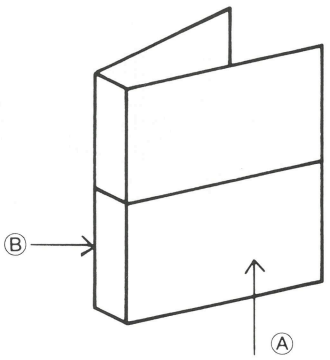

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fraction munchers

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instructional computing courseware
for the **apple® II** computer

This manual is compatible

with

the ***Fraction Munchers*** diskette

Version 1.x

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Fraction munchers [computer file]. -- Version 1.0.

1 computer disk : sd., col. ; 5 1/4 in. + manual.
System requirements: Apple II series; 128K; DOS 3.3; BASIC; 1 disk drive; monochrome or color monitor.
Title from title screen.
Edition statement from disk label.
Copy protected.
Audience: Grade 3-Adult.
Issued also on 3 1/2 in. computer disk.
Summary: Four educational games challenge students to race their Fraction Munchers in search of equivalent, non-equivalent, proper, improper, reduced, and other types of fractions while avoiding their foes, the Troggles.
Contents: Fraction types -- Equivalent fractions -- Comparing fractions -- [etc.]
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TABLE OF CONTENTS

Introduction 1

Program

Fraction Munchers

Description 2
Learning Objectives 2
Program Preview 3
General Information 3
Characters 4
Controlling the Fraction Muncher 5
Content of the Games 5
Fraction Types 5
Equivalent Fractions 5
Comparing Fractions 6
Fraction Expressions 6
Scoring 6
Levels of Play 7
Order of Key Values 7
Pausing within the Game 7
Ending the Game 7
Hall of Fame 7
Additional Graphics 8

Use in an Instructional Setting 9
Preparation 9
Using the Program 9

Management Options 10
Modify Game Settings 10
Modify Denominator Settings 13
Restore Original Settings 13
Erase Hall of Fame 13

Student Handouts 14

Appendices

A. Credits 18
B. MECC Services 19

INTRODUCTION

Welcome to ***Fraction Munchers***!

Fraction Munchers focuses upon several different but complementary mathematical skills involving fractions. Using a game format, you direct the Fraction Muncher to "eat" numbers or fractional expressions that match a criterion or a "key value." If you munch an incorrect number or expression, you lose a muncher. You must also avoid "Troggles," creatures that love to catch and devour Fraction Munchers.

Four different ***Fraction Munchers*** games can be played:

Game	Object
Fraction Types	to identify different types of fractional numbers
Equivalent Fractions	to identify fractions equivalent to a key value
Comparing Fractions	to compare the sizes of various fractional values
Fraction Expressions	to identify expressions that result in a number equal to a key value

Management Options enable you to select which games students may use, to set game parameters, and to erase the "Hall of Fame" lists. To use the Management Options, press Control-A (hold down the Control Key and press the A Key) when the main menu is displayed.

The sound effects in ***Fraction Munchers*** serve to motivate players, provide them with feedback about their performance, and warn them when a Troggle is about to enter a game screen. Sound may be turned on and off during the game by pressing Control-S.

Fraction Munchers requires an Apple II series computer (Apple //e, //c, or IIGS) with at least 128K of memory. (Note that this software will not work with an Apple II or II Plus.) The use of a joystick is optional, but the use of other input devices that also connect to the Apple's game port (such as game paddles or graphic pads) is *not* recommended. If you are using an Apple IIGS, you may find it easier to play the game with the system speed set to "normal" through the use of the control panel.

DESCRIPTION

Fraction Munchers is an educational game that reinforces mathematics concepts for students of any age from Grade 3 on up. The object of the game is to direct the Fraction Muncher to eat numbers or mathematical expressions that match a key value displayed at the top of the game screen. If a Muncher eats an incorrect number or expression or if a Muncher is caught by a Troggle, then the Muncher is lost.

Curriculum Area:	Mathematics
Subject:	Arithmetic
Topic:	Fractions
Type:	Educational Game
Grade Range:	3 - Adult
Classroom Use:	Individual

LEARNING OBJECTIVES

After using this courseware, the student will have practiced:

- identifying proper fractions, improper fractions, mixed numbers, and whole numbers;
- identifying the numerator and denominator in fractions;
- determining whether a fraction is reduced to lowest terms;
- identifying equivalent fractions;
- comparing the size of fractions;
- evaluating simple expressions involving fractions.

PROGRAM PREVIEW

General Information

The object of ***Fraction Munchers*** is to direct your Fraction Muncher to "eat" appropriate numbers or fractional expressions. Figure 1 shows a typical game screen from the Equivalent Fractions game. Each time you successfully clear the screen of all the target values, the game advances to the next level, with a different key value and a new set of targets and distractors.

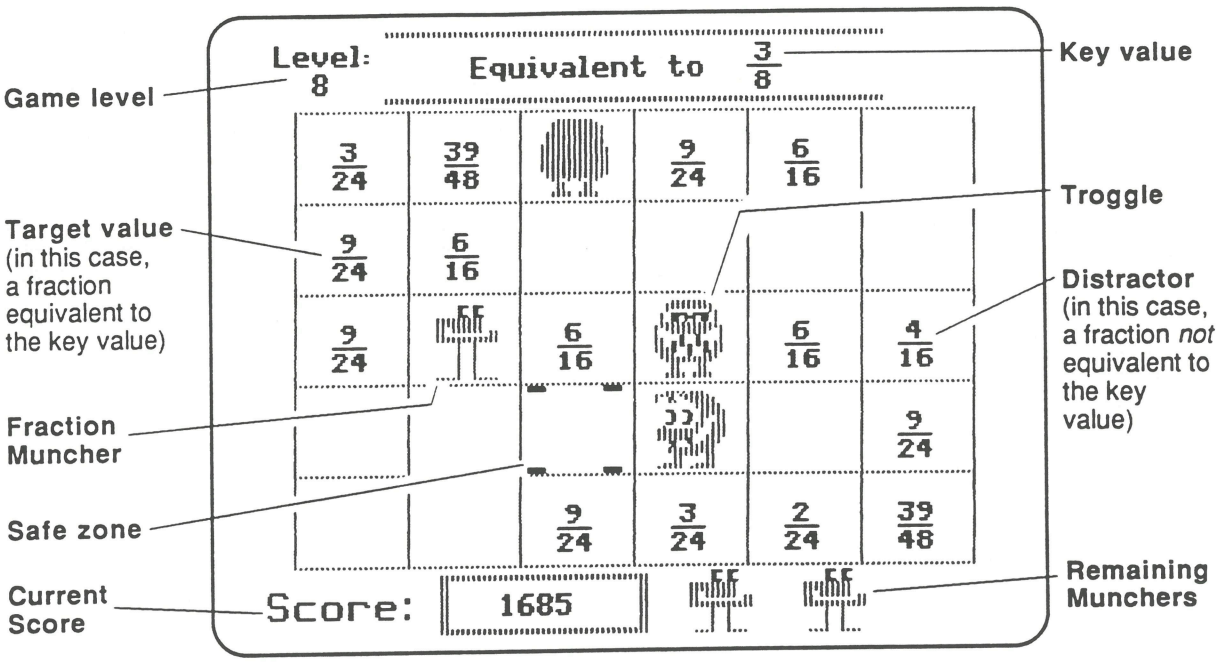


Figure 1

You may find it helpful to refer to Figure 1 as you read more about ***Fraction Munchers*** on the next few pages.

PROGRAM PREVIEW (continued)

Characters

Six different characters are used in ***Fraction Munchers***—one Fraction Muncher and five varieties of Troggles. The characters and a description of their behavior follows:

Fraction Munchers
(*Munchicus fracticus*)

You start the game with four Fraction Munchers (three in reserve and one on the game screen). You may earn one additional Muncher if your score reaches 1,000 points and another at 10,000 points. Fraction Munchers are under your control. This means that you choose the direction in which the Fraction Muncher moves and you determine when it will eat a number or expression (target). If the target eaten matches the key value displayed at the top of the game screen, then you earn points.

Reggies
(*Trogglus normalus*)

Reggies are the most common species of Troggle. These creatures travel in straight lines. When Reggies enter cells containing a number or expression, they eat it and leave another target or distractor in its place.

Helpers
(*Trogglus assistus*)

Helpers behave in a manner similar to Reggies except, when they enter cells containing a number or expression, they will eat it but not leave anything in its place. Unlike Reggies, Helpers move in random directions.

Workers
(*Trogglus laborus*)

Workers behave in a manner similar to Reggies except, when they enter cells, they always leave a number or expression behind whether the cells originally contained anything or not. Like Helpers, their movements are random.

Bashfuls
(*Trogglus timidus*)

Bashfuls behave in a manner similar to Reggies except they tend to avoid contact with Munchers. Otherwise, their movements are random.

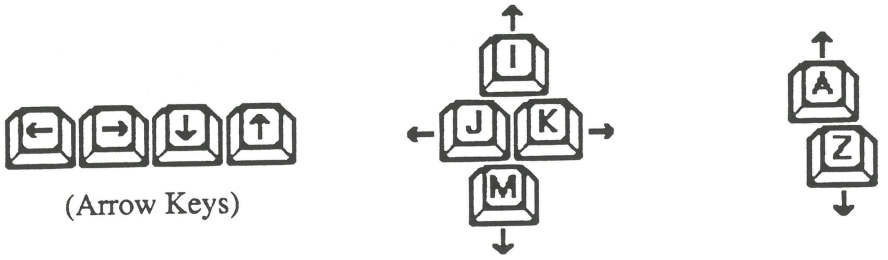
Smarties
(*Trogglus smarticus*)

Smarties travel in an unpredictable pattern until they get close to the Muncher. Then they will "home in" on the Muncher and try to catch it. They have no effect on the contents of cells.

PROGRAM PREVIEW (continued)

Controlling the Fraction Muncher

You move the Fraction Muncher by using a joystick or the computer keyboard. If you choose to use the keyboard, the following keys may be used:



(Arrow Keys)

Pressing the Space Bar or the joystick's fire button will make the Muncher eat the number or expression in the cell it is in.

Content of the Games

Four games are available in ***Fraction Munchers***: Fraction Types, Equivalent Fractions, Comparing Fractions, and Fractions Expressions.

Fraction Types. The object of Fraction Types (Figure 2) is to direct the Fraction Muncher to eat numbers of the type displayed at the top of the game screen. Management Options (see page 10) permit you to control student access to the game, the types of numbers seen, and the denominators used.

Equivalent Fractions. The object of Equivalent Fractions (Figure 3) is to direct the Fraction Muncher to eat fractions that are equivalent to the key value. The Management Options (see page 10) may be used to control student access to the game and the denominators used.

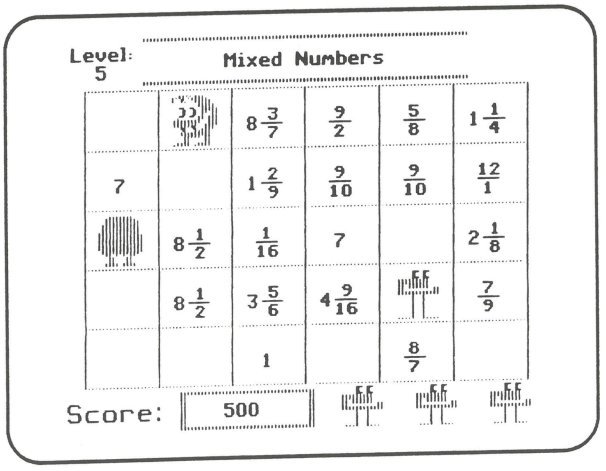


Figure 2

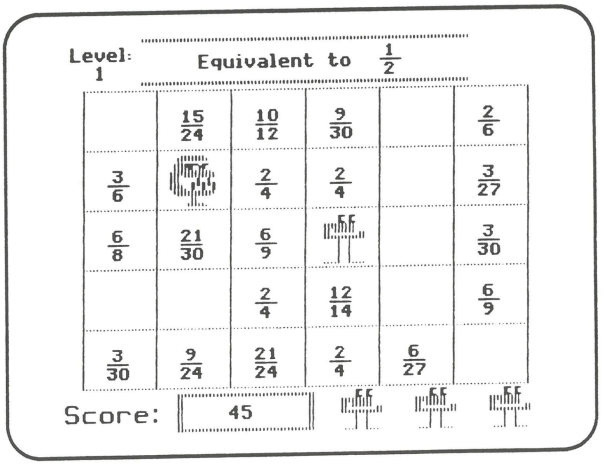


Figure 3

PROGRAM PREVIEW (continued)

Content of the Games (continued)

Comparing Fractions. The object of Comparing Fractions (Figure 4) is to direct the Fraction Muncher to eat fractions that are less than 1/2 or greater than 1/2. Management Options may be used to control student access to this game, the comparisons allowed, and the denominators used.

Fraction Expressions. The object of Fraction Expressions (Figure 5) is to direct the Muncher to eat expressions that, when solved, equal the key value. For example, if the key value is 1/2, then the following expressions would be valid targets: 1/4 + 1/4; 5/8 - 1/8; 2 x 1/4; and 1 ÷ 2. Management Options permit you to control student access to this game and the denominators used in the key values. You may also use the Management Options to control the arithmetic operations that are used (addition, subtraction, multiplication, and division). Any combination of these four operations may be used.

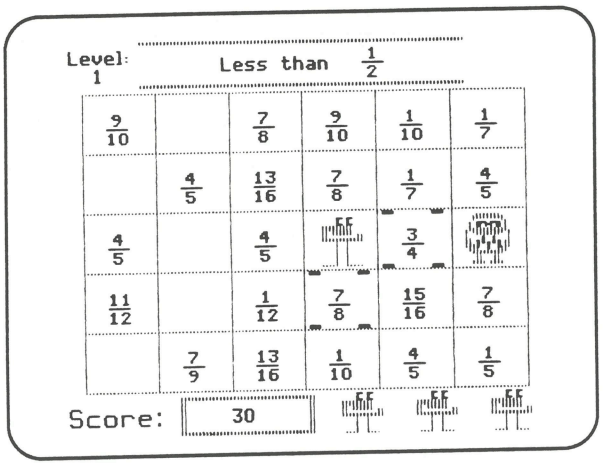


Figure 4

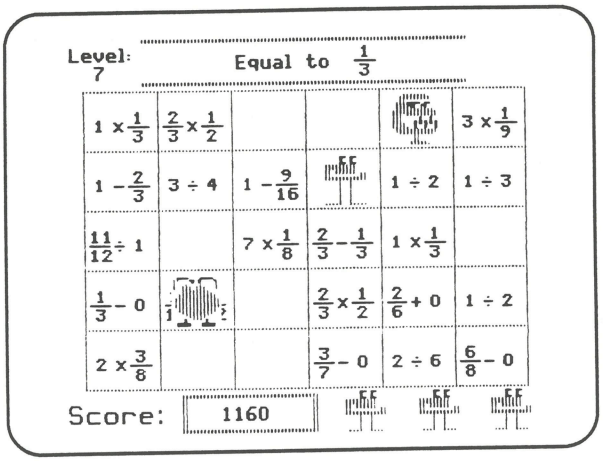


Figure 5

Scoring

Points are earned whenever the Fraction Muncher eats a correct number or expression (target). The value of the number or expression is dependent upon the level of the game:

Level	Point Value of Targets
1-3	5
4	10
5	15
6	20
7	25
8	30
9	35
10	40
11	45
12-18	50
19 +	75

PROGRAM PREVIEW (continued)

Levels of Play

When a game screen has been cleared of all the targets, the screen is erased and a new level of play is begun. The current level of play is indicated in the box in the upper left corner of the screen.

The content of any level of play is more difficult than that of the level immediately before. The mechanical aspects of the game also become progressively more difficult. Factors that may change between levels include:

- the maximum number of Troggles on the screen at once;
- the types of Troggles;
- the speed of the Troggles;
- the number of safe zones (cells that the Fraction Muncher may enter but that Troggles may not); and
- the point value per target.

Order of Key Values

Each level of play presents a new key value and a new set of numbers or expressions to munch. The key values are randomly selected from the set of allowed values. The values allowed depend on which denominators have been turned on through the Management Options.

Pausing within the Game

You may call "time out" and freeze the game by pressing the ? Key. To resume play, simply press the ? Key again. Each time you pause, points equal to those awarded for correctly munching a target are deducted from your score.

Ending the Game

Play ends whenever the last Fraction Muncher is lost or when you press the Escape (Esc) Key.

Hall of Fame

Fraction Munchers maintains a list of the ten highest scores for each game and the names of those who achieved them. If your score is greater than the lowest score on the list, then you will be given a chance to add your name to the list. You may use the Management Options (see page 13) to erase entries in the Hall of Fame.

Additional Graphics

After students have successfully completed three levels of play, a brief "graphic interlude" is displayed (Figures 6 and 7) for motivational purposes. Other such interludes appear after every three additional levels of play. There are six different interludes included in this package, each of which focuses upon a "memorable performance at the Muncher Olympiad."

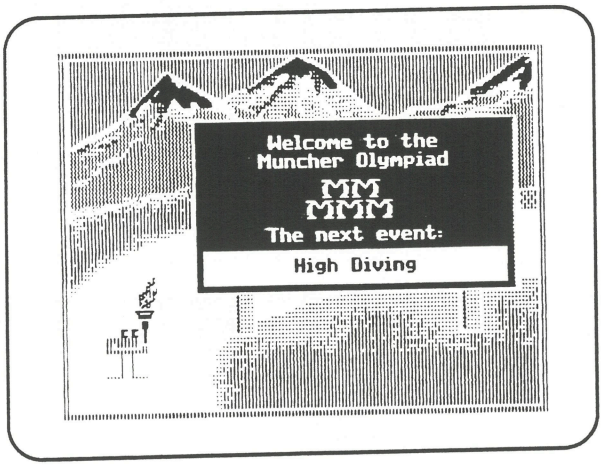


Figure 6

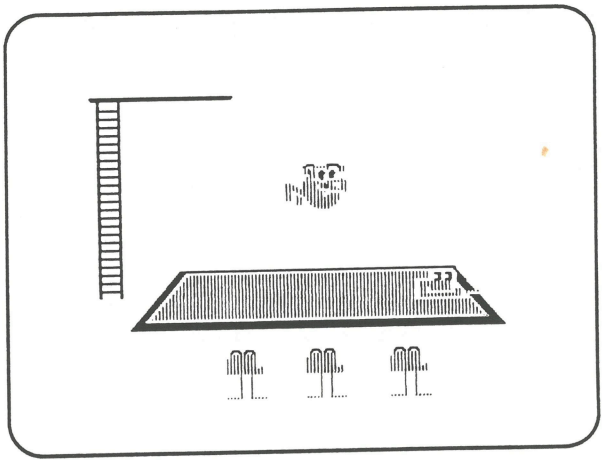


Figure 7

The six events featured in these interludes are long jump, shot put, high diving, figure skating, weight lifting, and the awards ceremony. The awards ceremony features a fireworks display and is only seen after 18 levels of successful play.

USE IN AN INSTRUCTIONAL SETTING

Preparation

Use the Management Options (see page 10) to set up the games you want students to use while playing ***Fraction Munchers***. For example, if you want students to drill on equivalent fractions and do not want them to use any of the other games in ***Fraction Munchers***, the Management Options screen can be set to look like Figure 8. For students needing practice on addition and subtraction of fractional expressions, set up the Management Options screen so that it looks like Figure 9.

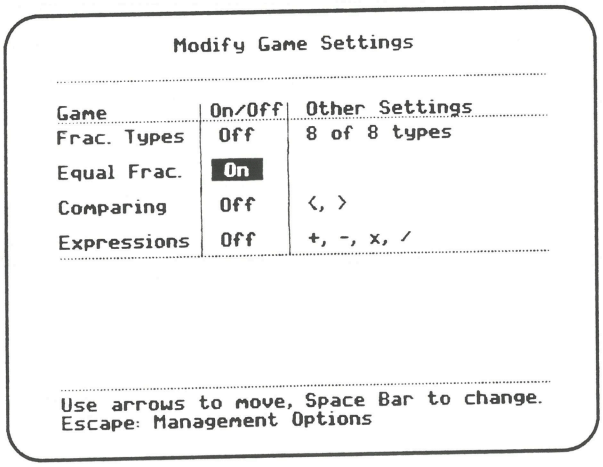


Figure 8

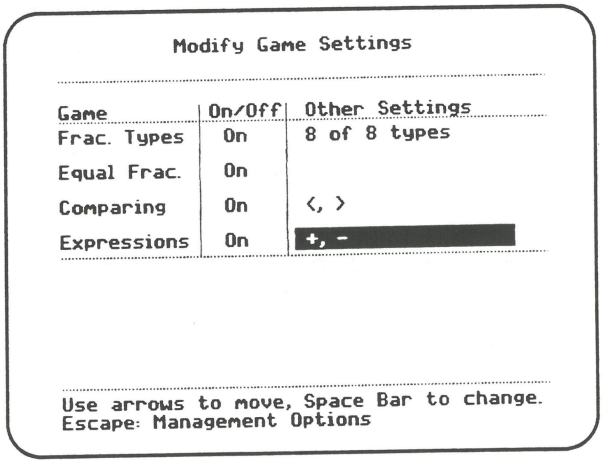


Figure 9

Using the Program

While students are first learning the game, it may be helpful for them to work in pairs. This will allow one student to work on mastering the game while another finds the correct targets. Eventually, however, you will want students to have the opportunity for extended individual play.

You might want to consider a ***Fraction Munchers*** tournament with prizes awarded to players with the best scores, the most improved player, and so on. Handout 1, "Muncher Award Certificate," may also be used for the winners. Alternatively, you may want to declare the entire class winners and award each student a certificate.

Handout 2, "A Note to Parents," has also been provided. You may wish to send it home with students to inform their parents about the use of ***Fraction Munchers***.

MANAGEMENT OPTIONS

Management Options allow you to determine which games students can play and to make adjustments to the educational content of each game. You may also restore the original game settings and erase individual Hall of Fame lists. To access the Management Options, press Control-A when the main menu is displayed (Figure 10). (To press Control-A, hold down the Control Key while pressing the A Key). The Management Options menu screen will then appear (Figure 11).

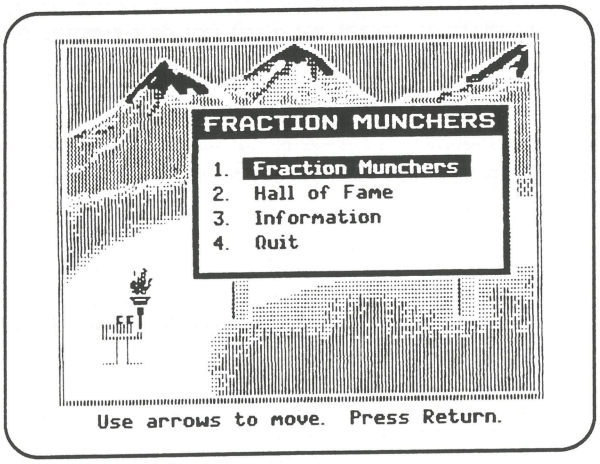


Figure 10

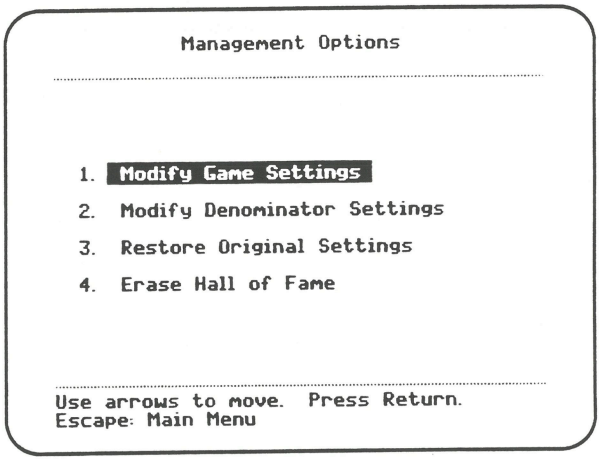

Management Options
1. Modify Game Settings
2. Modify Denominator Settings
3. Restore Original Settings
4. Erase Hall of Fame
Use arrows to move. Press Return.
Escape: Main Menu

Figure 11

Modify Game Settings

To check or modify the current game settings, choose Option 1 from the Management Options menu (Figure 12) and press Return. The game settings screen is then displayed (Figure 13). To modify a setting, use the Arrow Keys to highlight the setting you wish to modify and press Return.

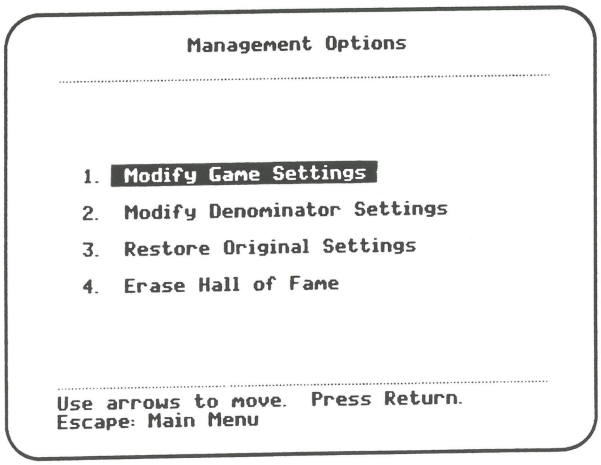

Management Options
1. Modify Game Settings
2. Modify Denominator Settings
3. Restore Original Settings
4. Erase Hall of Fame
Use arrows to move. Press Return.
Escape: Main Menu

Figure 12

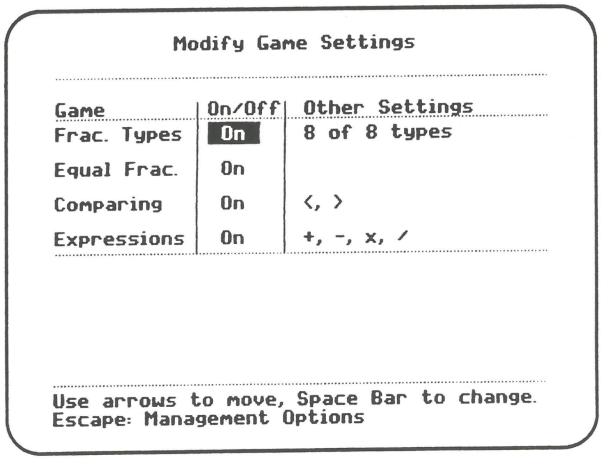


Figure 13

Modify Game Settings (continued)

The games available in ***Fraction Munchers*** are listed vertically in the column on the left. To the right of each game is information about its current settings.

The "On/Off" column indicates whether students are allowed to play a particular game. If more than one game is marked "On," then students will be given a choice of games to play. To modify this setting, use the Arrow Keys to highlight the setting you wish to modify and press the Space Bar. For example, with the on/off switches set as shown in Figure 14, the student will see the menu screen shown in Figure 15.

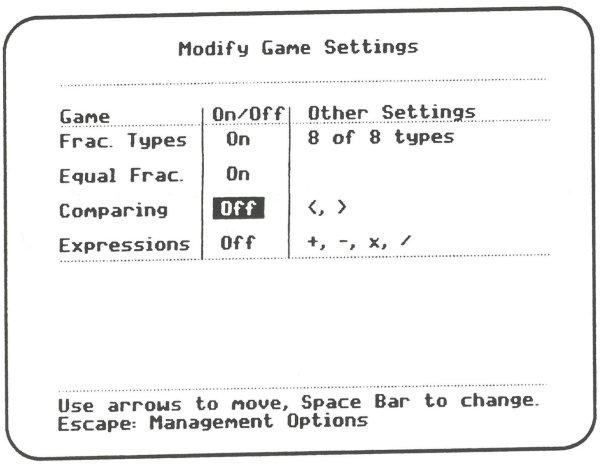


Figure 14

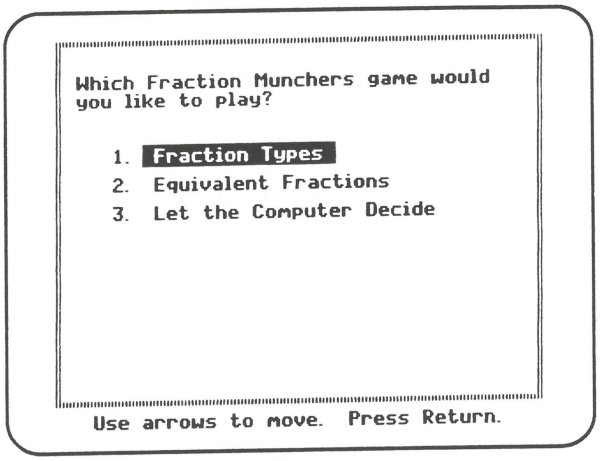

Which Fraction Munchers game would you like to play?
1. Fraction Types
2. Equivalent Fractions
3. Let the Computer Decide
Use arrows to move. Press Return.

Figure 15

The "Other Settings" column for Fraction Types allows you to regulate the types of numbers that are used as key values. When you select this option, a list of the eight types available appears (Figure 16). The types marked with a check mark are the ones that will be used. While the message that appears in the "Other Settings" column does not indicate the exact types being used, it will tell how many of the eight types are in use (Figure 17).

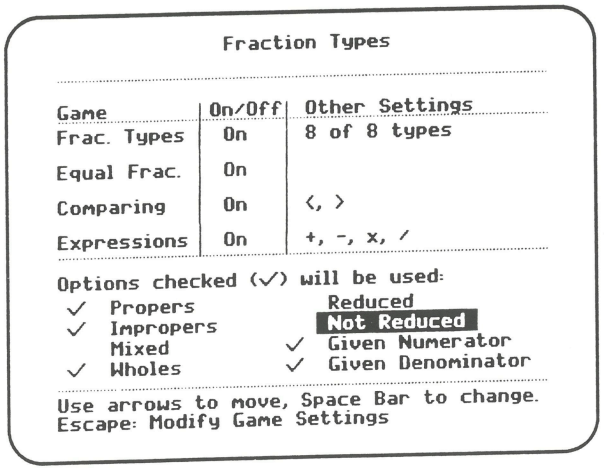


Figure 16

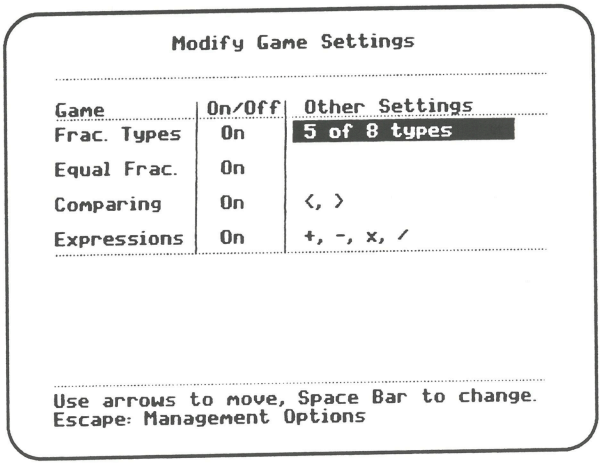


Figure 17

MANAGEMENT OPTIONS (continued)

Modify Game Settings (continued)

The "Other Settings" column in Comparing Fractions allows you to determine which mathematical comparisons are used. The two types allowed are "less than 1/2" and "greater than 1/2" (Figure 18). A typical game screen is shown in Figure 19.

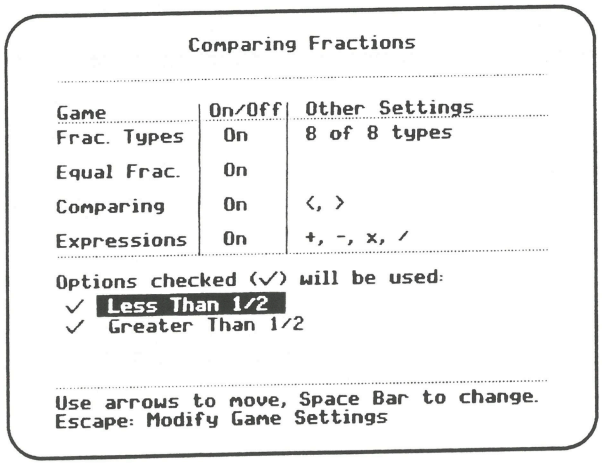


Figure 18

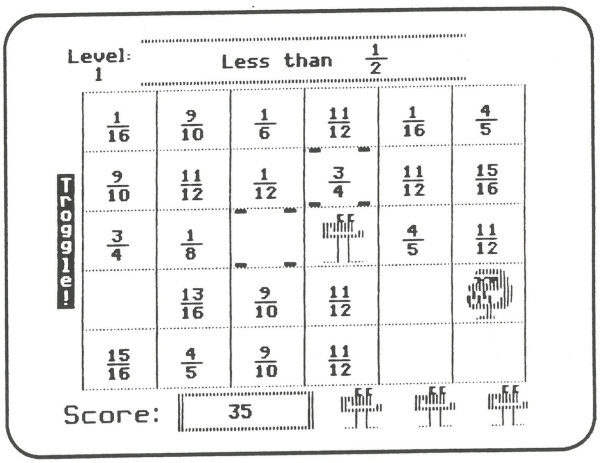


Figure 19

The "Other Settings" column for Fraction Expressions indicates which arithmetic operations are seen by students playing this game. You can regulate the use of the four operations (addition, subtraction, multiplication, and division) by selecting this option (Figure 20). The operations indicated with a check mark are the only ones that will be used in the actual game (Figure 21).

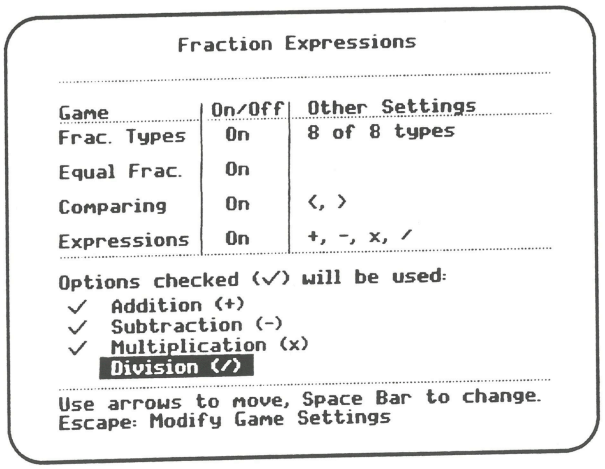


Figure 20

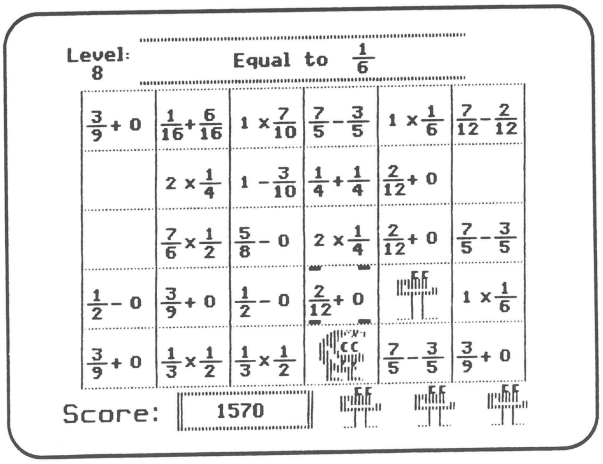


Figure 21

Modify Denominator Settings

The denominators used as key values and for generating fractions in the various games can be controlled by selecting Option 2, "Modify Denominator Settings," from the Management Options menu. The primary denominator set available is {2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 16}. The list shown will indicate with a check mark which denominators will be used (Figure 22). You may change any of the settings by simply moving the cursor to the box below the denominator that you want changed.

Note: In the Equivalent Fractions and Fraction Expressions games, the denominator settings are used to determine the key values. Other denominators will appear on the actual game screen (Figure 23).

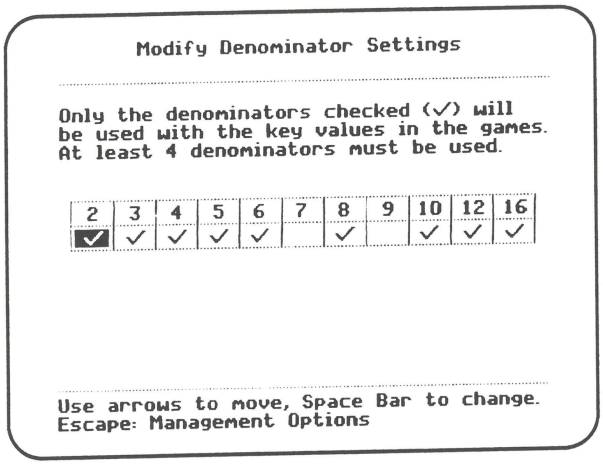

Modify Denominator Settings
Only the denominators checked (✓) will be used with the key values in the games. At least 4 denominators must be used.
2 3 4 5 6 7 8 9 10 12 16
Use arrows to move, Space Bar to change.
Escape: Management Options

Figure 22

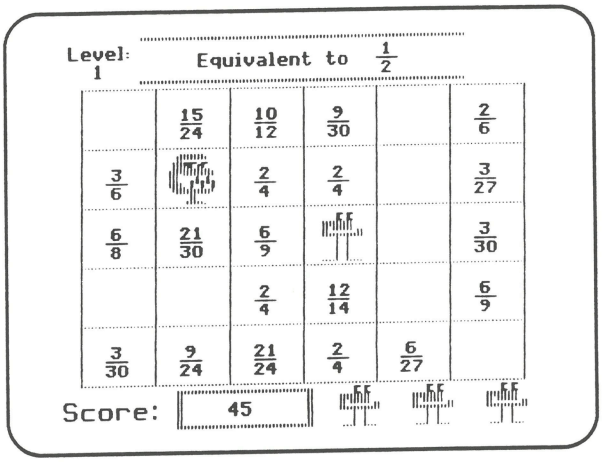


Figure 23

Restore Original Settings

You may wish to set all of the games in ***Fraction Munchers*** to their original settings. To do so, choose Option 3, "Restore Original Settings," from the Management Options menu. Note that in doing so any special settings you have made will be lost. The original settings have all features turned on and all denominators turned on with the exception of 7 and 9.

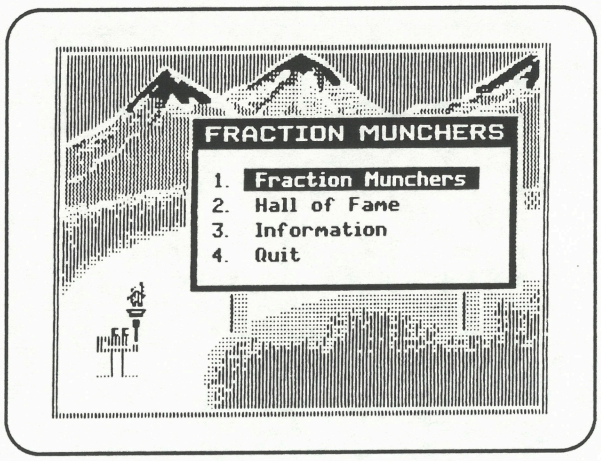
Erase Hall of Fame

Fraction Munchers maintains a list of the ten best scores for each game. After the tenth score is entered, only a score higher than the lowest score on the list will be recorded.

To delete one or more of these lists, choose Option 4, "Erase Hall of Fame," from the Management Options menu and select the Hall of Fame list(s) you wish to erase. When choosing to erase all of the lists at once, you will be given the opportunity to confirm your desire to erase the lists before returning to the Management Options menu. *This safeguard is provided because once you erase a list, it is permanently lost.*

Student Handouts

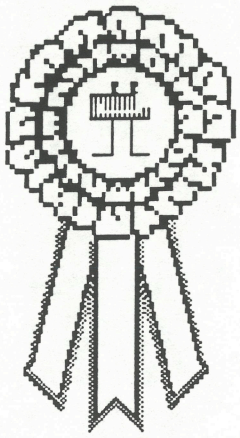
Fraction Munchers Award



This award is to certify that

_____

is an award-winning Fraction Muncher!



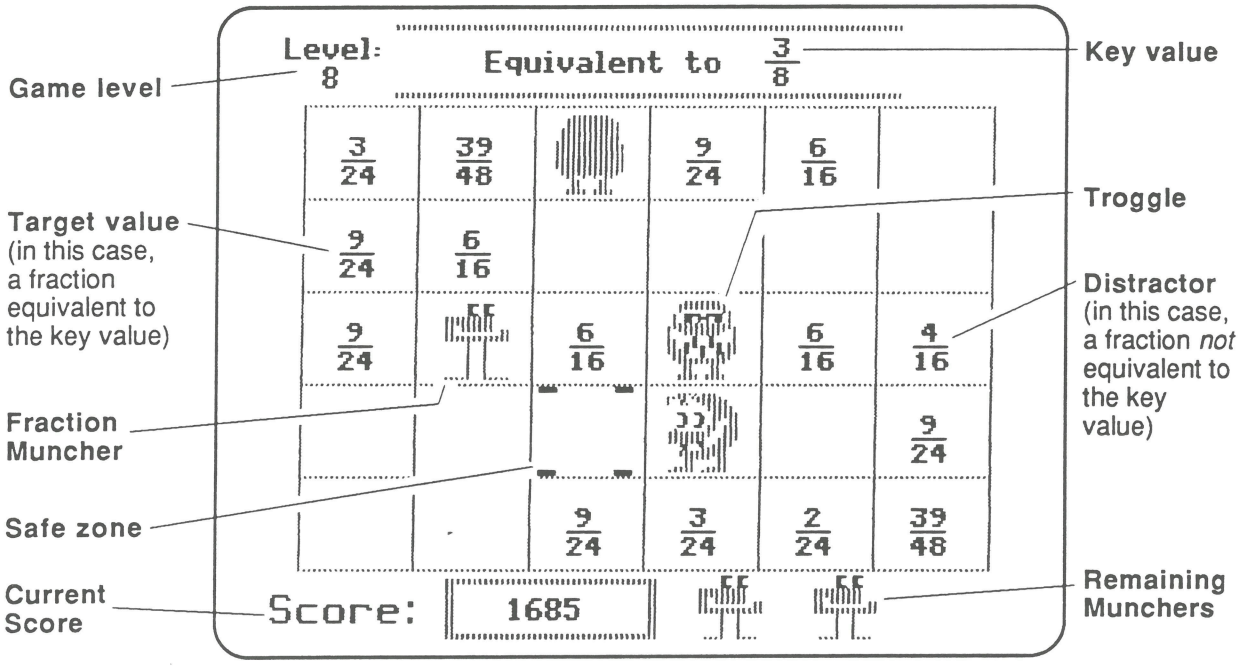
_____

Teacher

mecc

A NOTE TO PARENTS

As part of our work in mathematics, your child will be playing ***Fraction Munchers***, an educational computer game. A typical game screen looks like this:



Ask about ***Fraction Munchers*** and work with your child on those concepts that are proving difficult. Your child may not only become a champion Fraction Muncher but, more importantly, he or she will also learn to master fraction skills.

Sincerely,

_____

Teacher

Appendices

CREDITS

Fraction Munchers was produced by a MECC development team that included Craig Copley, Charolyn Kapplinger, Paul Noennig, Roger Shimada, Michael Stein, Craig Solomonson, James L. Thompson, and Paul Wenker.

TO THE READER:

MECC has made every effort to ensure the instructional and technical quality of this courseware package. Your comments—as user or reviewer—are valued and will be considered for inclusion in any future version of the product. Please address comments to:

MECC Courseware Development
3490 Lexington Avenue North
St. Paul, MN 55126

MECC SERVICES

MECC is an organization established in 1973 to assist Minnesota schools in implementing educational computing. MECC provides a variety of services to education, including 1) development and distribution of instructional computing courseware; 2) in-service training for educators and development of materials for conducting training; and 3) educational computing assistance through newsletters and equipment purchase contracts. MECC's knowledge and expertise in the educational computing field comes from more than fifteen years of working with and providing leadership for thousands of educators on a daily basis.

- ***MECC Educational Computing Catalog***
  A catalog containing descriptions of instructional computing courseware as well as training and planning materials is published annually and distributed at no charge. To request a catalog, write or call MECC Customer Services.

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- **Help Line**
  If you have any problems using MECC software:
  1) make note of the *name* and *version number* of the product;
  2) note the *brand* and *model* of the equipment involved, as well as the type of *printer card* used if the problem concerns a printer;
  3) write or call the Help Line to describe the problem **(612/481-3660)**.

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